AMENDMENTS TO THE CLAIMS

Kindly amend the claims as shown in the listing of claims below. This listing of claims will replace all prior versions, and listings of claims in the application.

1-11. (canceled)

12. (currently amended) An inorganic/organic nanolaminate barrier film, comprising:
a self-assembled structure comprised of:
a plurality of layers of an inorganic material; and
a plurality of layers each consisting of an organic polymer wherein the layers of organic polymer alternate with the layers of inorganic material and wherein more than one of layers of the organic polymer contain a superhydrophobic material;
wherein adjacent layers of the organic polymer and the inorganic material are covalently bonded layers characterized by direct organic polymer to inorganic material covalent bonds which form in the self-assembled structure even with superhydrophobic material in more than ~~the~~ one ~~or more~~ of the layers of the organic polymer~~ the barrier film has a permeability to water vapor of less than about 0.1 g/m^2/day~~.

13. (previously presented) The barrier film of claim 12 wherein the total number of layers of organic polymer and layers of inorganic material in the film is between about 100 and about 1000 layers, or between about 1000 and about 10,000 layers, or between about 10,000 layers and about 100,000 layers.

14. (original) The barrier film of claim 12 wherein each of the layers of inorganic material has a thickness of about 0.1 nm to about 1 nm; about 1 to about 10 nm; or about 1 nm to about 100 nm.

15. (original) The barrier film of claim 14 wherein the barrier film is substantially transparent.

16. (original) The barrier film of claim 12 wherein the barrier film has a permeability to oxygen less than about 1 cc/m^2/day, 0.1 cc/m^2/day, 0.01 cc/m^2/day, 10^{-3} cc/m^2/day, 10^{-4} cc/m^2/day, 10^{-5} cc/m^2/day, or 10^{-6} cc/m^2/day.

17. (previously amended) The barrier film of claim 16 wherein the barrier film has a permeability to water vapor less than about 0.01 $g/m^2/day$, 10^{-3} $g/m^2/day$, 10^{-4} $g/m^2/day$, 10^{-5} $g/m^2/day$, or 10^{-6} $g/m^2/day$.

18. (canceled).

19. (previously amended) The barrier film of claim 12 wherein the superhydrophobic material includes fluororalkylsilane.

20. (previously presented) The barrier film of claim 12 wherein the layers of organic polymer are made from polymer precursors to which one or more one or more hydrophobic groups have been added.

21. (original) The barrier film of claim 20 wherein the one or more hydrophobic groups are selected from the group of non-polar hydrophobic groups, methyl groups, benzyl (aromatic) groups, PO_4^{3-}, SO_4^{2-}, CH_3COO^-, Cl^-, Br^-, NO^-, ClO_4^-, I^-, SC_n^- anions, NH_4^+, Rb^+, K^+, Na^+, Cs^+, Li^+, Mg^{2+}, Ca^{2+}, Ba^{2+} cations, tryptophan, isoleucine, phenylalanine, tyrosine, leucine, valine, methionine, and alanine.

22. (original) The barrier film of claim 12 wherein the barrier film is made from a sol including one or more Gemini surfactants.

23. (original) An article of manufacture, comprising:
an object having a surface; and
an inorganic/organic hybrid nanolaminate barrier film of the type set forth in claim 12 disposed on the surface.

24. (original) The article of manufacture of claim 23 wherein the object is selected from the group of optoelectronic devices, LEDs, solar cells, FETs, lasers, pharmaceutical products, tablets in packages, medical devices, food products, packaged foods, beverages, candies, display screens, touch panel displays, flat panel displays, electroluminescent windows, windows, transparent films and coatings, electronic components, and chassis for appliances used in rugged environments.

25. (previously presented) The barrier film of claim 12 wherein one or more of the layers of organic polymer and/or inorganic material are in the form of lamellae.

26. (previously presented) The barrier film of claim 12 wherein one or more of the layers of organic polymer and/or inorganic material are in the form of tubules.

27. (Canceled).

28. (previously presented) The barrier film of claim 12 wherein adjacent layers of the organic polymer and inorganic material are covalently bonded to each other at an interface between organic and inorganic materials.

29. (previously presented) The barrier film of claim 12 wherein the layers of the organic polymer are discrete layers of organic polymer and wherein the layers of inorganic material are discrete layers of inorganic material.

30. (previously presented) The barrier film of claim 12 wherein alternating layers of organic polymer and inorganic material present a long and tortuous penetration path through the barrier film to an underlying substrate.

31. (previously presented) The barrier film of claim 12 wherein layers of the inorganic material are self-assembled layers of inorganic material.

32. (previously presented) The barrier film of claim 12 wherein layers of the organic polymer are self-assembled layers of organic polymer.

33. (previously presented) The barrier film of claim 12 wherein at least one coating of material self-assembles into the alternating plurality of layers of inorganic material and plurality of layers of organic polymer.

34. (previously presented) The barrier film of claim 12 wherein layers consisting of the organic polymer and layers of the inorganic material have different material compositions.

35. (previously presented) The barrier film of claim 12 wherein the layers of inorganic material are layers consisting of the inorganic material.

36. (currently amended) An inorganic/organic nanolaminate barrier film, comprising:
a self-assembled structure comprised of:
a plurality of layers of an inorganic material; and

a plurality of layers each consisting of an organic polymer wherein the layers of organic polymer alternate with the layers of inorganic material and wherein more than one of layers of the organic polymer contain a superhydrophobic material;

wherein adjacent layers of the organic polymer and the inorganic material are covalently bonded layers characterized by direct organic polymer-inorganic material covalent bonds between adjacent layers which form in the self-assembled structure even with the superhydrophobic material in the one or more layers of the organic polymer;

wherein the layers of the organic polymer contain superhydrophobic material ~~and wherein a total number of layers of organic polymer and layers of inorganic material is sufficient so that the barrier film has a permeability to water vapor of less than about 0.01 $g/m^2/day$~~.

37. (currently amended) A device comprising:

a photovoltaic device with an inorganic/organic nanolaminate barrier film formed thereon, wherein the self-assembled barrier film comprises:

a plurality of layers of an inorganic material; and

a plurality of layers each consisting of an organic polymer wherein the layers of organic polymer alternate with the layers of inorganic material and wherein more than one of the layers of the organic polymer contain a superhydrophobic material;

wherein adjacent layers of the organic polymer and the inorganic material are covalently bonded layers characterized by direct organic polymer-inorganic material covalent bonds between adjacent layers which form in the self-assembled barrier film even with the superhydrophobic material in the one or more layers of the organic polymer;

wherein the layers of the organic polymer contain superhydrophobic material ~~and wherein a total number of layers of organic polymer and layers of inorganic material is sufficient so that the barrier film has a permeability to water vapor of less than about 0.01 $g/m^2/day$~~;.

38. (currently amended) The barrier film of claim 12 wherein superhydrophobic decreases the permeability of the barrier film while still providing for self-assembly of nanostructures by way of micelle formation and incorporation of polymer precursors into the micellar interiors and the barrier film is at least 1000 nm thick comprised of individual layers, each about 1 nm thick.